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A Study to Assess the Knowledge and Practice about Radiation Safety among Nursing Personnel working in Radiation Exposure Area in Selected Hospital in Kolkata, WB, India

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Abstract: ***This study aimed to assess the knowledge and practices regarding radiation safety among nursing personnel working in radiation exposure areas in selected hospitals in Kolkata. Using a descriptive survey design, data were collected from 60 nurses through questionnaires and observation checklists in various hospital units. Findings revealed that a significant number of nurses had inadequate knowledge and poor practices related to radiation safety. No significant association was found between the nurses' knowledge and their age, experience, or professional qualifications. The study highlights the need for better radiation safety training and resources to improve nursing practices in these settings.***

Keywords: Radiation safety, nursing personnel, knowledge assessment, practice evaluation, Kolkata hospitals

1. Statement of the Problem

A study to assess the knowledge and practice on radiation safety among nursing personnel working in radiation exposure area in selected hospitals of Kolkata

2. Objectives of the Study

a) To assess the knowledge about radiation safety among nursing personnel working in radiation exposure area.
b) To identify the practice about radiation safety among nursing personnel working in radiation exposure area.
c) To find-out the correlation between knowledge and practice on radiation safety.

3. Research Methodology

Research design
Descriptive survey design was adopted for this study.

Sampling technique
Total enumerative sampling technique was adopted for collecting the data. All the nursing personnel working in radiation exposure area in selected hospitals were included as the sample of the present study.

Sample size
60 nursing personnel who are working in radiation exposure area

4. Final Data Collection Procedure

Data collection was done from 11/12/2012 to 29/12/2012 by administering knowledge questionnaire and observation check list. Data were collected from all nursing personnel working in cardiac catheterization O.T, Orthopedic O.T where C-Arm is used, brachy therapy unit, Cobalt- 60 unit, radiotherapy units.

- Ethical permission was taken from ethics committee IPGME&R SSKM Hospital.
- Formal permission was taken from Principal and hospital Superintendent, Nursing Superintendent, Departmental Head of Calcutta Medical College and Hospital, S.S.K.M Hospital, Chittaranjan National Medical College and Hospital, Kolkata.
- Data collection schedule was planned according to the shifting duty of nursing personnel after discussion with Nursing Superintendent and Ward sisters.
- After Self introduction, nature of study was explained to each sample and assured about the confidentiality of their response and written consent was taken. 20 – 25 minutes were taken to answer the entire questionnaire.
- They were requested to answer all the questions.

- Knowledge questionnaire was administered to the individual nurse separately according to their availability.
- Their practices were observed about radiation safety measures when they were working in their respective clinical fields.

Data analysis

Organization and presentation of data:
The data had been organized and presented under the following sections.
Section I: Findings related to the demographic characteristics of sample in terms of frequency and percentage.
Section II: Findings related to knowledge of nursing personnel about radiation safety.
Section III: Findings related to practice of nursing personnel about radiation safety.
Section IV: Findings regarding the relationship between knowledge and practice and association of knowledge and practice with selected variables.

Section I:
Findings related to the demographic characteristics of sample in terms of frequency and percentage.

Table 1: Frequency and percentage distribution of nurses according to the demographic characteristics, n=60

Characteristics	Frequency	Percentage
Age in years		
24 – 28	07	11.66
29 – 33	11	18.34
34 – 38	08	13.34
39 – 43	14	23.33
44 and above	20	33.33
Years of experience		
<1 -10	24	40.00
11 – 20	21	35.00
21 – 30	10	16.71
31 – 40	05	08.33
Professional qualification G.N.M B.Sc (N)	56 04	93.33 6.66

Data presented in table1 indicated that maximum numbers of nursing personnel were belonging to the age group of 44 and above (33.33%). 11.66% in the age group of 24 – 28 years. Nearly 18% of the nurses belonged in the age group of 29 – 33 years, 13.34% in the age group of 34 – 38 years and 23.33% in the age group of 39 – 43 years.

Data also revealed that majority (40%) of the nurses had less than 1 to10 years of total working experience, 35% had 11 to 20 years of experience, 16.67% had 21-30 years of experience and 8.33% of the nurses possessed 31 -40 years of total working experience.

Most of the nurses (93.33%) were GNM and only 4(6.66%) nurses had B. Sc. Nursing degree.

Table 2: Frequency and Percentage distribution of nurses according to demographic characteristics, n= 60

Characteristics	Frequency	Percentage
Years of experience in radiation exposure area <5	46	76.66
5-9	12	20
10-15	02	3.34
Attended any special training on radiation safety Yes	Nil	Nil
No	60	100

Data presented in table 2 indicated that majority of the nursing personnel i.e. 46 out of 60 (76.66%) had worked less than 5 years in radiation exposure area, 20% of them worked 5 - 9 years and only 3.34% i.e. 2 nurses had the experience of working for 10 -15 years in the same field. None of the nurses had undergone any special training on radiation safety.

Section II:
This section described the findings related to assessment of the knowledge of the nursing personnel working in radiation exposure area about radiation safety.

Table 3: Frequency and Percentage distribution of the nurses according to their knowledge scores, n=60

Knowledge score	Frequency	Percentage
Excellent>80% (>19)	09	15
Good 71-80% (17-19)	14	23.34
Fair 61-70% (14-16)	18	30
Poor <60% (<14)	19	31.66

Maximum possible score= 24
Minimum possible score= 0

The data presented in Table 3 showed that maximum number of nurses (31.66%) had poor knowledge about radiation safety. Thirty percent of the respondents had fair knowledge and 23.34% of the nurses had good knowledge on the same subject. Only 15% of the nurses possessed excellent knowledge on radiation safety.

Table 4: Distribution of the nurses according to their knowledge scores and years of experience in radiation exposure area n=60

Years of experience in radiation exposure area	Excellent >80% (>19)	Good 71-80% (17-19)	Fair 61-70% (14-16)	Poor <60% (<14)
<5	8(13.11)	12(20)	14(23.33)	12(20)
5-9	1(1.67)	3(5)	4(6.66)	4(6.66)
10-15	1(1.67)	1(1.67)	Nil	Nil

Data presented in the Table 4 showed that 13.11% of the nurses had excellent knowledge scores, 20% scored good, 23.33% scored fair and 20% scored poor who had <5 years of experience in radiation exposure area.

Similarly, there were twelve nurses (20%) participated in the present study had 5-9 years experience in radiation exposure area. Out of them 4 nurses scored poor, 4 fair, 3 good and 1 nurse could be considered as excellent knowledge as far as their knowledge in radiation safety was concerned.

Data also revealed that out of 2 nurses with 10-15 years experience, one had excellent knowledge and another one had good knowledge on radiation safety.

Table 5: Result of Chi square test of association between age and knowledge score of the respondents n = 60

Age in years	Knowledge score <median	≥ median	Total	Chi square value
≥ 40	16	12	28	.866
<40	22	10	31	
Total	38	22	60	

df = 1, P>0.05 level of significant

Data presented in table 5 showed that among 28 in the age group of above and equal to 40 years, out of them 16 respondents had below median knowledge score and 12 had at and above median knowledge score. Whereas out of 32 in the age group of below 40 years, 22 had below median knowledge score and 10 had above median knowledge score. Chi- square value computed to determine the association between age and knowledge score of the respondents which was statistically non significant, it could be concluded that there was no association between age and knowledge of the respondents on radiation safety.

Table 6: Area wise maximum possible score, mean and mean percentage of knowledge score of nurses about radiation safety
n=60

Area	Maximum possible score	Mean	Mean percentage
Time of exposure	2	0 .91	45.5
Distance from the source	3	1.52	50.66
Shielding	8	6.08	76
General safety	11	6.83	62

The data in Table 6 showed that maximum scored 76% was obtained by the nurses in the topic related to shielding followed by general safety (62%), distance from the source 50.66% and time of exposure 45.5%.

Section III:
This section described the findings related to assessment of the practice of the nursing personnel working in radiation exposure area about radiation safety

Table 7: Frequency and Percentage distribution of the nurses according to their practice scores, n = 60

Practice score	Frequency	Percentage
Excellent >90% (>9)	Nil	Nil
Good 80-90% (8-9)	01	1.66
Fair 70-80% (7-8)	06	10
Poor <70% (<7)	53	88.34

Maximum Possible score = 10
Minimum possible score = 0

The data presented in Table 7 showed that maximum number of nurses (88.34%) had poor practice about radiation safety. Ten percent of the respondents had fair practice and 1.66% of the nurses had good practice on the same subject. None of the nurses possessed excellent practice on radiation safety.

Table 8: Distribution of the nurses according to their practice scores and years of experience in radiation exposure area, n=60

Years of experience in radiation exposure area	Excellent >90% (>9)	Good 90-80% (9-8)	Fair 80 -70% (8-7)	Poor <70% (<7)
<5	Nil	1(1.66)	3(5)	42 (70)
5-9	Nil	Nil	2(3.34)	10 (16.66)
10-15	Nil	Nil	2(3.34)	Nil

Data presented in the Table 8 showed that 70% of the nurses had poor practice scores, 5% scored good, 1.66% scored fair and none of them scored excellent who had <5 years of experience in radiation exposure area.

Similarly, there were twelve nurses (20%) participated in the present study had 5-9 years experience in radiation exposure area. Out of them 10 nurses scored poor, 2 fair and no one scored good or excellent practice as far as their practice in radiation safety was concerned.

Data also revealed that out of 2 nurses with 10-15 years experience, both had fair practice on radiation safety.

Table 9: Result of Chi square test of association between ages and practice score of the respondents

n = 60

Age in years	Practice <median	Score ≥ median	Total	Chi square value
≥ 40	17	08	25	1.120
<40	28	07	35	
Total	45	15	60	

df = 1, P>0.05 level of significant

Data presented in table 9 showed that among 25 in the age group of above and equal 40 years,17 respondents had below median knowledge score and 8 had at and above median knowledge score. Whereas out of 35 in the age group of below 40 years,20 had below median knowledge score and 7 had above median knowledge score. Chi- square value computed to determine the association between age and practice score of the respondents which was statistically non-significant, it could be concluded that there was no association between age and practice of the respondents on radiation safety.

Table 10: Area wise maximum possible score, mean and mean percentage of practice score of nurses about radiation safety, n = 60

Area	Maximum possible score	Mean	Mean percentage
Time of exposure	1	0.34	35
Distance from the source	2	1.95	97.5
Shielding	3	1.36	44.33
General safety	4	1.45	36.25

The data in Table 10 showed that maximum scored 97.5% was obtained by the nurses in the topic related to distance from the source followed by shielding (44.33%), general safety (36.25) and time of exposure 35%.

Section IV:
Findings regarding the relationship between knowledge and practice and association of knowledge and practice with selected variables.

Table 11: Range, mean, median, SD, mean percentage, correlation and t-value related to the knowledge and practice score of respondents, n=60

Area	Range	Mean	Median	SD	Mean Percentage	r		t
Knowledge Score	8-22	15.29	18	0.475	63.70	0.034	0.034	1.673
Practice Score	4-8	5	6	0.134	30			

df = 58, p<0.05 level of significant

Data presented in Table 11 showed that the range of knowledge score of respondents is 8-22 and range of practice score is only 4-8. Mean of the knowledge score is 15.29 and mean of practice score is 5. Median of the knowledge score is 18 and median of the practice score is 6. SD of the both the variables is 0.475 and 0.134 respectively. Mean percentage of knowledge score (63.70%) is higher than mean percentage of practice score is (30%).

Data also revealed that there was positive correlation in between knowledge and practice on radiation safety but degree of correlation was weak. t-value computed between knowledge score and practice score was not statistically significant at 0.05 level of significance indicating that there was no statistically significant relationship between knowledge and practice of the nurses regarding radiation safety. So, it could be concluded that knowledge and practice of the nurses of the present study regarding radiation safety were independent of each other.

Table 12: Correlation coefficient and t value computed between knowledge and practice scores of the nurses and selected variables, n = 60

Variable	r	t value
Knowledge score and years of experience	0.087	0.667
Practice score and years of experience	0.059	0.450
Knowledge score and years of experience in radiation exposure area	-0.174	.355
Practice score and years of experience in radiation exposure area	0.112	0.840

df = 58, p< 0.05 level of significant

Data presented in Table12 showed that r value and t value computed between knowledge, practice, years of experience and years of experience in radiation exposure area were statistically not significant at 0.05 level. So it could be concluded that knowledge, practice and years of experience and years of experience in radiation exposure area of the nurses of the present study regarding radiation safety were independent of each other.

Table 13: Result of Chi square test of association between professional qualification and knowledge score of respondents, n = 60

Professional qualification	Knowledge score <median	≥ median	Total	Chi square value
G.N.M	39	17	56	0.666
B.Sc (nursing)	02	02	04	
Total	41	15	60	

df = 1, P>0.05 level of significant

Data presented in table 13 showed that among 56 G.N.M nurses, 39 had below median knowledge score and 17 had at and above median knowledge score. Whereas out of 4 B.Sc (n), 2 had below median knowledge score and 2 had above median knowledge score. Chi- square value computed to determine the association between professional qualification and knowledge score of the respondents which was statistically non significant at 0.05 level. Thus, it could be concluded that there was no association between these two variables on radiation safety.

5. Conclusion

The result revealed that the nursing personnel had inadequate knowledge regarding radiation safety and their practices were also not adequate. It was found that there was non- availability of radiation safety manual and adequate radiation protective devises in those units which could be considered as an important factor for lack in the existing knowledge and practice of the nursing personnel.